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# The Effect of Internal and External Project Factors on the Performance of Road Improvement Projects in Papua Province

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Internal Project Factors; External Project Factors; Project Performance; Road Improvement Projects; Papua Province.

**ABSTRACT**

This study aimed to analyze the influence of Internal Project Factors and External Project Factors on the performance of road improvement projects in Papua Province. The research was motivated by the importance of successful road construction projects in supporting regional connectivity, particularly in Papua Province, which faces complex geographical, logistical, and project implementation challenges. Internal factors, including project management, human resource competence, heavy equipment availability, and contractor financial capacity, as well as external factors, such as weather conditions, social factors, and bureaucratic processes, were assumed to influence project performance. The research employed a qualitative approach using a survey method through questionnaires distributed to parties directly involved in road construction projects, including Commitment-Making Officials (Pejabat Pembuat Komitmen or PPK), Technical Activity Implementation Officers (Pejabat Pelaksana Teknis Kegiatan or PPTK), supervisory consultants, and contractors. A total of 196 respondents participated in this study. The data were analyzed using IBM SPSS Statistics 26 through validity testing, reliability testing, classical assumption testing, multiple linear regression analysis, partial significance testing (t-test), simultaneous significance testing (F-test), and coefficient of determination ($R^2$) analysis. The results showed that Internal Project Factors (X1) had a positive and significant effect on Project Performance (Y), whereas External Project Factors (X2) did not have a partially significant effect. Simultaneously, both independent variables significantly influenced project performance. The coefficient of determination ($R^2$) value of 0.434 indicated that the two independent variables explained 43.4% of the variation in project performance, while the remaining 56.6% was influenced by other factors outside the research model.

## INTRODUCTION

The development and improvement of road infrastructure represent one of the national development priorities outlined in the National Medium-Term Development Plan (Rencana Pembangunan Jangka Menengah Nasional or RPJMN), aimed at enhancing regional connectivity, accelerating economic growth, and promoting equitable development throughout Indonesia, including Papua Province (Bappenas RI Website, 2025). Road improvement projects in Sarmi Regency, Jayapura Regency, and Keerom Regency play a strategic role in expanding inter-regional transportation access, facilitating community mobility, and supporting the distribution of goods and services to improve public welfare.

However, the implementation of road improvement projects in these areas continues to face various challenges that affect project performance, particularly in achieving targeted time, cost, and quality outcomes (Haji Karimian et al., 2019; Kaliba et al., 2009; Mongina & Moronge, 2021; Mwakajo & Kidombo, 2017; Nasser & Erzaij, 2025; Oluwajana et al., 2022). One of the most common issues is project completion delays, which result in work not being completed according to the planned contract schedule (Ajayi & Chinda, 2022; Albtoush et al., 2022; Gurgun et al., 2024; Wahab et al., 2023). Consequently, several projects require contract addenda or extensions of implementation periods. These conditions may increase project costs due to additional operational expenses, heavy equipment utilization, labor costs, and supervision costs during the extended implementation period.

In addition to time and cost constraints, the availability of construction materials remains a significant challenge in implementing road improvement projects in Papua (Aisyah & Sentosa, 2023; Haider & Giustozzi, 2025; Murib et al., n.d.; Saktina & Khoirunnurrofik, 2022; Yasmin et al., 2026). Geographical conditions, limited transportation access, and long material distribution routes often contribute to delays in material delivery to project sites (Heaton et al., 2022; Khursheed et al., 2024; Scott et al., 2025; Subiyanto et al., 2023). The unavailability of materials at the required time can disrupt construction progress and affect the achievement of project targets (Data from the Sarmi Regency PUPR Office, 2025).

Contractor management capability also plays an important role in determining project success (Artpairin & Pinmanee, 2023; Daboun et al., 2023; Ghorbani, 2023; Malek & Bhatt, 2024; Muneer et al., 2022; Naji et al., 2022). The ability of contractors to plan activities, control project execution, manage resources, coordinate field operations, and supervise construction activities is essential for achieving effective and efficient project performance. Weak project management systems may reduce control over project schedules, costs, and quality, potentially resulting in delays and inconsistencies during project implementation (Data from the PUPR Offices of Sarmi Regency, Keerom Regency, and Jayapura Regency, 2025).

Furthermore, weather conditions represent one of the external factors that frequently hinder road improvement projects in Papua. High rainfall intensity and unpredictable weather patterns can disrupt field activities, particularly earthworks, paving operations, and the mobilization of materials and equipment. These conditions often reduce work productivity and extend project completion periods beyond the planned schedule (Data from the PUPR Offices of Sarmi Regency, Keerom Regency, and Jayapura Regency, 2025).

Socio-cultural factors within local communities also influence the implementation of road construction projects. The presence of customary activities, customary land rights, and the need for effective communication and coordination with communities surrounding project locations may affect construction progress if not properly managed. In addition, human resource factors, including both construction workers and project management personnel, represent important determinants of project success. Limited availability of skilled workers, insufficient experience, and inadequate technical and managerial capabilities may reduce the effectiveness of project implementation in the field (Data from the PUPR Offices of Sarmi Regency, Keerom Regency, and Jayapura Regency, 2025).

The novelty of this research lies in its integrated analytical framework, which simultaneously examines internal and external project factors within a single regression model to provide a comparative assessment of their relative influence on project performance in the

Papua context. This approach enables the identification of critical factors contributing to project success and provides evidence-based insights for resource allocation and project management strategies. Furthermore, this study contributes to the limited empirical literature regarding construction project performance in Papua by providing practical implications for policymakers and industry practitioners.

Based on these conditions, internal and external project factors are considered to influence the performance of road improvement projects in Sarmi Regency, Jayapura Regency, and Keerom Regency. Therefore, this study was conducted to examine the influence of these factors on road improvement project performance. The findings are expected to serve as an evaluation reference and provide input for the government, contractors, and other relevant stakeholders in improving the success of road construction project implementation in Papua Province. Specifically, this research focused on government-funded road improvement projects managed by the Public Works and Spatial Planning Office (Dinas Pekerjaan Umum dan Penataan Ruang or PUPR) across several districts in Papua Province, namely Sarmi Regency, Keerom Regency, and Jayapura Regency.

## METHOD

### Data Types and Sources

This study used both primary and secondary data. Primary data were collected through questionnaires and interviews with respondents involved in road improvement projects in Papua Province, including contractors, supervisory consultants, and project owners. These data were used to examine the influence of internal and external project factors on project performance.

Secondary data were obtained from project documents, implementation reports, scientific literature, journals, and other relevant sources. These data supported the analysis and strengthened the research findings.

### Data Collection Techniques

The data collection techniques in this study were carried out through questionnaires, interviews, observations, and documentation. The questionnaire was used as the main instrument to obtain primary data from respondents involved in road improvement projects in Papua Province. Measurements use a five-level Likert scale.

In addition, interviews are conducted to obtain more in-depth information about the factors that affect the performance of the project. Field observations are carried out to find out the real conditions of project implementation, while documentation is used to obtain secondary data in the form of project documents, work reports, and other supporting archives.

### Data Analysis Techniques

The data analysis technique in this study uses a qualitative method with multiple linear analysis with the help of IBM SPSS Statistics. Before hypothesis testing, a validity test, a reliability test, and a classical assumption test are first carried out. Furthermore, hypothesis testing was carried out using multiple linear regression analysis, t-test, F test, and determination coefficient ($R^2$) to determine the influence of internal and external factors of the project on the performance of the road improvement project in Papua Province.

## RESULTS AND DISCUSSION

### Analysis of Instrument Feasibility Integration and Classical Assumptions

Before regression models were used to prove hypotheses, research data had passed validity and reliability tests to guarantee the objectivity of the measuring tool. All question indicators are declared valid because they have a value (r-count > 0.1402). In the initial reliability test of the Internal Factor variable (X1), *Cronbach's Alpha* coefficient was below standard (0.569 < 0.60). Early detection through *Item-Total Statistics* showed that item **P2 had a negative correlation (-0.065).** The bias in item P2 indicates that there is redundancy or a misunderstanding of the respondents' understanding of the wording of the question sentence. After item P2 is eliminated, the reliability value rises to **0.652**, so that all variables meet the instrument's reliability principle.

In the classical assumption test, the residual distribution is proven to be normal through the graphical representation of *the P-P Plot* that is close to the diagonal line. The absence of multicollinearity (VIF = 1.450 < 10.00) proves that there is no *overlap* of information between independent variables. Evaluation of the feasibility of the model simultaneously yielded a value **(F - Count = 73.938)** with an absolute significance value **of 0.000**. This proves that the combination of Internal Factors (X1) and External Factors (X2) has an excellent level of model alignment (*goodness of fit*) to predict Project Performance (Y) performance. The determination coefficient (R2 = 0.434) showed that the interaction of these two independent variables contributed **43.4%** to the variation in the performance achievement of road improvement projects in Papua Province.

### Discussion of the First Hypothesis (H1): Dominance of the Influence of Internal Factors of the Project

Partial testing provides a strong empirical justification for the First Hypothesis (H1). The Project Internal Factor variable (X1) was shown to dominate the direction of change of the dependent variable with a value **(t-count = 10.217 > 1.972)** and a significance value **of 0.000 < 0.05**. A positive regression coefficient (**0.364**) means that any improvement in the project's internal governance will have a direct impact on significantly improving project performance.

Theoretically, these findings are in line with *the Resource-Based View* (RBV), which states that the performance excellence of an organization or project is largely determined by the ownership of capabilities and internally resources that are optimally managed. Within the research locus of road improvement projects in Papua Province, internal factors play a crucial role for several contextual reasons:

1. **Technical Competence and Managerial Experience:** Papua's mountainous geographical terrain with limited accessibility requires project management teams to have high skills. The ability to arrange realistic and flexible *scheduling* is the main differentiator between projects that run on time or experience *delays*.
2. **Accuracy of Internal Manufacturing and Logistics Planning:** The dependency of the supply chain of specific materials (such as asphalt bitimen or heavy equipment) that must be imported from outside the island demands precise internal inventory management. Companies with solid internal coordination are able to minimize *idle time* due to raw material vacancies.
3. **Quality Control System:** Strict internal supervision of the method of carrying out dredging, base-course soil compaction, and asphalt stretches greatly determines the

resistance of the road to high rainfall typical of Papua. When the internal control system is running well, the risk of *rework* that triggers cost overruns can be minimized.

**Discussion of the Second Hypothesis (H2): Insignificance of the Influence of External Factors of the Project**

The most contrasting finding in this study was the rejection of the Second Hypothesis (H2). The Project External Factor variable (X2) empirically does not have a significant influence on Project Performance (Y). This is shown by a regression coefficient that is close to zero (-0.002), a value (t-count = -0.047 < 1.972), and a very high significance value (0.962 > 0.05).

Scientifically, this insignificance does not mean that external environmental challenges in Papua Province do not exist or have no impact. External obstacles such as extreme weather (sudden heavy rain), fluctuations in material prices due to macro inflation, licensing bureaucracy, and socio-societal dynamics (such as customary customary rights) are often realities. However, the absence of a statistically significant influence on the ups and downs of project performance can be dissected through the following managerial analysis:

1. **Risk Internalization:** Construction contractors operating in Papua Province generally have a mature *learning curve*. They have internalized these external risks into *baseline planning*. Weather barriers or social turmoil are no longer considered sudden disturbances, but have been calculated as a component of time *allowance* (grace time) and cost contingencies in the contract document.
2. **Reduction Effect by Internal Capabilities:** The strong influence of internal variables (X1) statistically acts as a buffer against external shocks (X2). This means that no matter how bad the external environmental conditions are, the impact can be mitigated if project management has a risk mitigation system, sound finances, and persuasive public relations (local community approach).
3. **Standardization of Contract Regulations:** The current national and provincial road infrastructure construction service procurement mechanism has adopted a standard external mitigation system (such as *force majeure* clause or price adjustment / *escalation clause*). This makes external fluctuations contractually compensated, so that they do not directly damage the main performance indicators of the project (cost, quality, time) that are the object of respondents' assessment.

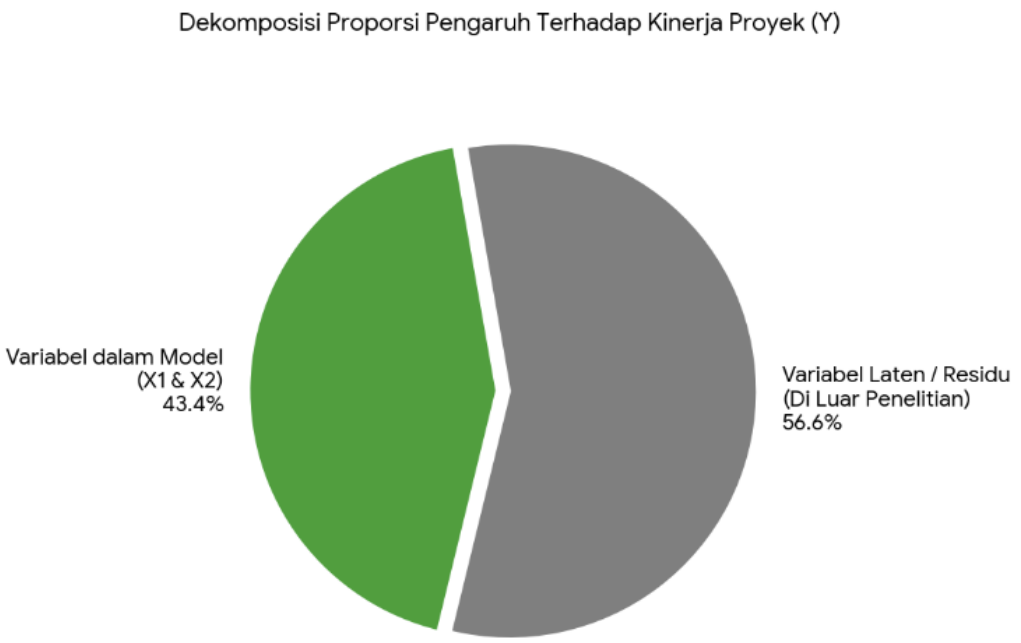



**Figure 1.** Decomposition of the Proportion of Influence on Project Performance (Y)

**Theoretical explanation of residual effects (56.6%) :**

The large portion of latent variables outside the model (56.6%) suggests that the performance of road infrastructure projects in Papua is influenced by a very wide spectrum of variables Table 4.11 Based on global construction management theory, these residual factors are most likely to be dominated by:

1. *Organizational Culture Aspect*: Alignment of communication between *the owner* (Public Works Office), supervisory consultants, and main contractors.
2. *Construction Technology*: The use of the latest soil stability methods or asphalt mix innovations that are adaptive to the high humidity of Papuan soils.
3. *Macro Policy Intervention*: The pattern of multi-year budgeting (*multi-year contracts*) from the central government that affects the stability of the supply of development funds for disadvantaged regions.

**Summary of Analysis Results**

Based on the results of data analysis, hypothesis testing, and discussions that have been described regarding the influence of Project Internal Factors (X1) and Project External Factors (X2) on the Performance of Road Improvement Projects in Papua Province (Y), the results of data analysis can be summarized as follows:

1. Based on the results of the statistical data analysis of the Project Internal Factor Variable Validity Test (X1), it is known that out of the 10 statement items tested, there is 1 (one) statement item that is declared not to meet the requirements for scientific validity, namely item P02. This invalidity is indicated by the value of the Pearson Correlation coefficient r-count of item P02 of 0.113, which is smaller than the r-table threshold limit of 0.1402. In addition, the significance value of item P02 was above the tolerance threshold (0.116 > 0.05).

2. Based on the results of statistical data analysis of the Project External Factor Variable Validity Test (X2), it is indicated that all statement indicator items (P01 to P10) that make up the Project External Factor variable (X2) are declared 100% valid. This empirical proof is shown by the value of the item-total correlation coefficient r-calculated of each statement moving from 0.235 to 0.569, where all of these values are significantly above the critical threshold of r-table which is 0.1402. In addition, the significance value (Sig. 2-tailed) for each item is below the error limit of 0.05 (i.e. it is worth 0.000 and 0.001 for item P06). Thus, all instrument items in the Project External Factors (X2) variable have valid accuracy to be used in research data collection and can be continued to the next stage of statistical analysis
3. Based on the results of statistical data analysis of the Project Performance Variable Validity Test (Y), the results were obtained that all statement indicator items (P01 to P08) for the Project Performance variable (Y) were declared valid. This empirical reliability is evidenced by the value of the Pearson Correlation coefficient r-calculated of each item that is well above the critical limit line r-table 0.1402. In addition, the significance level (Sig. 2-tailed) for all eight items of the instrument absolutely indicates the number 0.000, where this value is well below the threshold of error tolerance $\alpha = 0.05$. Thus, the entire question structure in the Project Performance questionnaire (Y) was proven to have objective measurement accuracy and was ready to be used in inferential data processing.
4. Reliability Test of Project Internal Factor Variables (X1), Through further analysis of indicators in the Item-Total Statistics table, it was found that the weakness of this reliability value was significantly triggered by item P2 which had a negative correlation value (Corrected Item-Total Correlation of -0.065). Therefore, in order to meet the methodological principles of quantitative research, an elimination (elimination) action was carried out on the P2 item. After retesting without including the problematic item, the Alpha Cronbach value of the Project Internal Factor variable (X1) was significantly increased to 0.652 with a total of 9 valid question items
5. Test of Reliability of Project External Factors Variables (X2) Based on the results of the empirical comparison, it can be drawn that all statements that make up the Project External Factors variable (X2) are declared to be very reliable
6. The Project Performance Variable Reliability Test (Y), the result of the analysis, obtained a final Cronbach's Alpha coefficient value of 0.679. The value of Cronbach's Alpha coefficient of 0.679 was then tested comparatively by referring to the quantitative reliability standard of 0.60. The results of the comparison showed that the empirical reliability value of the Project Performance variable (Y) had significantly exceeded the minimum limit of the standard ($0.679 > 0.60$). Thus, a methodological conclusion is drawn that all question items in the Project Performance variable (Y) are declared reliable (consistent) (Y).
7. Internal Project Factors (X1) have been proven to have a positive influence on the Performance of Road Improvement Projects in Papua Province (Y). This is indicated by a t-count value of $10.217 > 1.972$) with a significance level of $0.000 < 0.05$. A regression coefficient of 0.364 indicates that any improvement in the quality of internal management, HR competence, machine reliability, and contractor financial health will have a direct impact on improving project performance in the field.

8. Project External Factors (X2) have no effect on the Performance of Road Improvement Projects in Papua Province (Y). This finding is supported by a very weak t-count value of -0.047 < 1.972) with a significance level of 0.962 > 0.05. This shows that external variables such as weather fluctuations, social dynamics of the community, and bureaucratic constraints are not the main determinants of project performance, as these risks have generally been anticipated and mitigated from the early stages of contract planning.
9. The dominant internal factors for the performance of the Road Improvement project in Papua Province are project workers who have adequate competence, well-carried out project planning, coordination between parties in the project that runs effectively, and supervision of project work that is carried out consistently. This is shown by the usual analysis test of Mean, Median and Mode which shows that the mean value for internal factors is 4 (agree) based on questions and questionnaire assessments.

## CONCLUSION

Based on the results of data analysis, hypothesis testing, and discussion presented in the previous chapter regarding the influence of Internal Project Factors (X1) and External Project Factors (X2) on the performance of road improvement projects in Papua Province (Y), it was concluded that internal project factors had a positive and significant influence on project performance, whereas external project factors did not have a significant effect on project performance. The dominant internal factors contributing to the performance of road improvement projects in Papua Province included competent project personnel, effective project planning, efficient coordination among project stakeholders, and consistent supervision of project activities.

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